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Aquaculture in Alberta

ISSN Number 1481 - 0115 Issue Two, Summer 1998

I Stock' em, U - Fish' em

U - **Fish** or **Pay for Fishing** is a way of fishing many Alberta families will soon be familiar with. This form of fishing is commonplace in Europe, and is also well advertised along the coastal areas of North America. The transition to U-Fish will occur as more wild fish stocks become depleted and costs escalate for transportation, fuels, fishing licenses, camping, and public access. Driving less than one hour on good roads and paying affordable rates for guaranteed fishing success and adjacent camping sites is attractive to many families.

In 1997, fifteen Commercial Fish Culturists in Alberta charged fees for people to fish their private waters. Records show 1,734 anglers spent 8810 hours of paid fishing at private facilities. Although 5,000 fish were noted as caught, the number of fish captured and released would be considerably greater.

Under the Provincial Fisheries Act, when a fish culturist receives money from selling fish or fishing opportunities, he must possess a Commercial Class A license. The cost for the license is $75.00 per year.

Depending on the site, anglers can be charged for the fish they catch, for the opportunity to fish, or a combination of both. Some charge by the hour, the day, or year that a person fishes.

Some owners charge a daily flat fee for each person fishing and a set price for each fish kept, regardless of size. Others include a two fish catch with the entrance fee. There are also those who charge only for the fish caught and kept. Finally, a growing number of U-fish operators are moving towards memberships; where for a few hundred dollars, select clients can access excellent year round fishing.

You could be fishing dugouts, ponds or even small lakes. One central Alberta facility is on a 40 acre lake, with the owner providing boats, picnic areas, and overnight camping.

Features

I Stock'em You Fish'em 1
Muddy Tasting Trout 2
Waterfowl Deterrent System 3
Aquatic Weed Identification and Control 4
Alberta Fish Farmer Association 6
Aquaculture Section Update 6
Aquaculture on the Internet 7
Research Update 7
Courses, Publications & Events 8
Editor's Notes 8

Alberta
AGRICULTURE, FOOD AND RURAL DEVELOPMENT

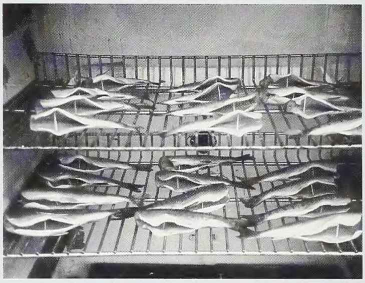
Even free fly fishing lessons can be arranged. Some U-fish operators will accommodate large groups, such as schools, corporations, senior citizen events, or other social gatherings.

Doug Smith of Alta- View Trout near Innisfail does not allow catch and release fishing because of the resulting high fish mortality. Doug feels that hooking injuries are a major contributing factor of fish kills in intensively stocked ponds. He also requires that a minimum of 6 lb test monofilament line be used. "It is disheartening to see a number of your carefully raised trout, belly up and floating after the weekend's fishing spree. It comes out of the fish farmer's pocketbook."

One very important issue is flavor of the fish meat. If fish exhibit a musty or muddy taste, your meat for the table customers quit coming. Continuous aeration usually solves this problem; if not, don't be afraid to change the pond to a catch and release fishery. All customers taking fish home should have an invoice from the U-fish premise detailing dates, number and type of fish and destination. This might be the only evidence that your fish were not taken from public waters, where licenses and strict limits apply.

Private paid fishing has great potential. Like golfing, you are outdoors in the elements, only minutes away from home or office. There is no rush once you're out on the water, and the whole family can participate, anytime. Fly fishing or fly tying schools can be held, in a setting where techniques can be tested and developed, with good fishing success. Fish Pro's could be brought in to help teach. Who knows, maybe there's potential for a fly Fishing Pro Shop...

Muddy Tasting Fish - Causes and Recommendations



In pond culture, trout flesh may become "muddy" tasting. Blue-green algae (simple plants) and micro-organisms called Actinomycetes, are often found in prairie ponds and dugouts. These organisms produce a compound called geosmin. Geosmin produces an earthy-musty flavour and odour, which is excreted into the water and absorbed by fish. Numbers of geosmin producing blue-green algae increase during the summer with warmer water temperatures.

The "muddy" taste in trout flesh usually decreases in late fall with cooler water temperatures. Fish caught after freeze up are normally free of the geosmin compound. It's a good idea to sample a few trout for "taste tests" two to three weeks before harvest is planned.

Recommended practices to reduce problems with off-flavours in pond cultured fish

Fish can be purged by holding them for 4 to 7 days in fresh-flowing water free of geosmin. They should not be fed during this time. If trout must be harvested while geosmin is still retained in the body, smoking the fillets will dilute or mask the muddiness and improve the flavour.

Feeding fish or fertilizing adds nutrients to the culture pond. This further contributes to the proliferation of organisms responsible for off-flavour in trout (blue-green algae and actinomycetes). To minimize fish feed waste, use only good quality feeds and do not overfeed.

Algae problems usually relate to excessive amounts of nitrogen and phosphorus in the system. Pond water should be exchanged whenever possible to lessen the potential for growth of those organisms causing the 'earthy-musty' flavours. Trout caught from ponds with continuous aeration do not usually have a muddy taste.

Use of barley straw bales has been shown to minimize excessive growth of nuisance algae. When placed in a pond, barley straw releases algal inhibitors. Copper sulphate, a registered chemical algaecide, can be used for short term algae control. However, care must be taken, as excessive dosages will kill fish. As well, the resulting plant decomposition robs oxygen from the water. Chemical shading with dyes also inhibit algae growth. This is achieved by suppressing sunlight and interaction with photosynthesis

Waterfowl Deterrent System

The Waterfowl Deterrent System, created by HKD Developments Inc., is designed to prevent waterfowl from landing on water reservoirs. Initially developed for application on drinking water reservoirs where bird excrement causes water contamination, the system can also be applied to fish reservoirs where significant losses occur from the birds devouring fish.

The idea for the deterrent system actually started when the Town of Coaldale workers were using guns to scare birds off their reservoirs. The guns weren't working; causing a greater problem by raising havoc with area dogs and shattering the peace. As a result, HKD began designing an environmentally and ecologically friendly system, requiring little maintenance and virtually invisible to passers-by.

The Town of Coaldale (15 km east of Lethbridge) is the first commercial user of the system and has applied it to one of their 200 metre by 300 metre drinking water reservoirs.

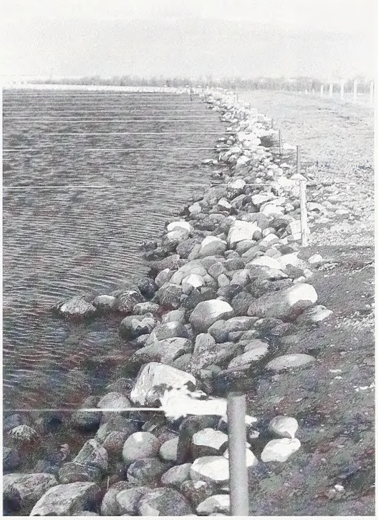
The simple but effective system consists of stringing special high tensile wire at 4-metre intervals across the water. These wires act as a visual deterrent to waterfowl when attempting to land. Also, the stretched wire creates an ultrasonic sound, inaudible to humans, but creating a noise deterrent to waterfowl. For water bodies over 30 metres (100 ft), a compression spring is required on each wire. This compensates for temperature contraction and expansion (which can be as much as 160 mm (6.25 inches) on a span of 244 metres (800 ft).

"When you watch ducks and other birds come in to land, you see that they need a certain distance for approach, similar to that of an airplane. The wire prevents them from landing," says Herman Kastner, the company founder. "It works for all types of birds including ducks, geese, and sea gulls. Even pelicans and great blue herons stay off."

"The prototype system", says Kastner, "was installed on a reservoir located adjacent to a similar unprotected reservoir. The reservoir with the Waterfowl Deterrent System is completely free of waterfowl while the unprotected reservoir is covered with birds."

The system has possibilities for application with the fish farming industry. Fish ponds stocked with small fish are especially vulnerable. Alberta Agriculture, Food and Rural Development - aquaculture section recorded total fish losses in dugouts stocked with fingerling Triploid Grass Carp. Cormorants and Blue Herons were responsible for the loss.

Bird scaring devices may work for short periods of time but birds get used to them very quickly. The use of netting to deter predators is costly, labourious to install and difficult to work around. The Waterfowl Deterrent System could be a simple, effective and relatively inexpensive solution.



Bird Deterrence - Wilson Colony, Coaldale

"However", warns Eric Hutchings, aquaculture biologist for AAFRD "hungry birds are more difficult to repel. You might need to string the wires closer together, sometimes allowing less than a one metre spacing between wires." Some of the wading birds eventually learn to land on shore beside the wire and walk down to the food source. You will then need to consider adding wire to the sides and ends.

If your pond is used for angling or U-Fish operations, then this system is definitely not an option. In these cases the human scarecrow routinely moved and refitted with clothing might be your first practical choice. For more information on design, manufacturing and components of the Waterfowl Deterrent System from HKD Developments Inc. please contact Mr. Darryl Kastner P. Eng at (403) 257-0124, Mr. Herman Kastner at (403) 345-4371 or Svat Jonas P.Eng at (403) 381-5870

AQUATIC WEED IDENTIFICATION

Aquatic plant species are those plants that spend considerable time in the water. They are often considered to be aquatic weeds because they interfere with the management objectives of that water body. However, aquatic plants are an integral component of the ecology of ponds and dugouts. Unfortunately, water bodies are not static; they change with time due to nutrient enrichment, sedimentation, vegetation decomposition and run-off. Certain species of aquatic plants adapt quick to changes, and flourish. Their prolific growth can make them an undesirable weed. In fish culture sites, excessive plant growth interferes with angling for fish, can cause summer and winter fish kills by depleting oxygen, can plug filters and screens, and can contribute to flavor and toxin problems.

It is essential to properly identify all aquatic weeds, prior to initiating any control. Aquatic plants are grouped into two categories: **macrophytic plants**, (seen with the naked eye) and **algae** (being microscopic in size).

White Water Buttercup

Macrophytic plants commonly have leaves, stems, roots, and flowers. Three major categories of macrophytes found in Alberta are: free-floating, submerged, and emergent.

Floating aquatic plants grow on or near the water surface. Free floating plants are not rooted to the bottom and include plants like duckweed, bladderwort, and liverwort. Duckweed, usually mistaken for algae, has weed potential by covering or shading the surface of a pond. However, duckweed is normally beneficial, since waterfowl do feed on it and fish use it for cover.

Submersed aquatic plants are rooted or attached and live completely underwater. Those plants known to cause aquatic weed problems include: Canada Waterweed, White Water Buttercup, Coontail, Northern Watermilfoil, Sago Pondweed, and Clasping-leaf Pondweed. Some can have visible surface flowers and leaves that float. Yellow Water Lily or Water Smartweed are in this category.

Emergent aquatic plants are found in shallow water areas or along the shoreline. They grow above the water, rooted in soils near or under the water. The plants are usually rigid in structure and capable of withstanding considerable water saturation. Some of Alberta's emergent aquatic plants include: reed grass, cattails, bulrushes, arrowhead, and burreed. Cattails and bulrushes can take over water body edges to an extent where control becomes necessary.

Short-term control can be accomplished by either mechanical, chemical or biological means. Mechanical control can include hand pulling, raking, dragging a chain across the dugout bottom, drawing down water or dredging.

Common Cattail

It is important to remove all loosened plant life, as plant decomposition robs the water of oxygen.

Chemical control is restricted to application of Reglone A on submerged weeds. Since this product acts as a contact herbicide, prolific weed growth reduces the chemical's effectiveness.

Biological control can be accomplished in some contained waters of Alberta using sterile grass carp. This fish species forages on many different aquatic weeds, including pondweeds, waterweeds, plantain, and filamentous algae.

The other Alberta aquatic plants are grouped into **Algae.** These are the simplest and most primitive plants, having no leaves, stems or roots. They reproduce by spores and cell division. Algae are mainly microscopic in size, but can group or clump together, becoming highly visible. Some species of algae can cause considerable problems in aquaculture. The three types of algae are: filamentous, planktonic and macrophytic.

AND CONTROL IN ALBERTA PONDS

Northern Milfoil

Filamentous algae are long stringy hair-like filaments that, during ideal summer conditions, turn into mats of "floating scum" on the water.

This algae initially grows on the pond bottom, but can rise to the surface as oxygen produced by the plants make them bouyant.

Macrophytic algae are the larger, more advanced algae forms. They can be easily seen on the pond bottoms and have coarse whorls of leaf-like branches. Chara (skunkweed) is the one Alberta species of macrophytic algae. It is a light green/grey/yellow color and gives off a musky odor. This algae is common in hard or alkaline waters. Calcium or mineral deposits adhere to the plant's surface, giving the plant a gritty feeling. Chara serves as good substrate for fish habitat.

Planktonic Algae are microscopic plants that exist throughout the water column, tending to accumulate in the upper reaches of water. They begin to appear as microscopic specks, needles, or grass clippings. These algae can be blue green, brown or simply green. The blue-green algae have a slimy texture and disintegrate most rapidly. Under idea conditions of temperature, nutrition, and light, these algae grow very rapidly. Thick pea-soup conditions may occur in the water during intensive blooms of planktonic algae. Blooms of blue-green algae are a concern to fish ponds, as during their die-off, large quantities of dissolved oxygen are consumed. Also, problems with taste and odor and consumption toxicity can occur.

Controlling an algae problem is not easy. For long-term results one must look at reducing sources of nutrient loads. This could require fencing off cattle access, changing drainage, dredging the pond or liming. Maintaining good aeration is necessary (Aquaculture in Alberta, Issue #1).

Chemical control should only be considered as a short-term solution. Copper sulphate (Bluestone) can be used on most algae, but only during early stages of growth before it gets to the clumping or bloom stages. Treat one-third of the pond each day at a rate of 1/4 to 1/2 pound of copper sulphate per 100,000 gallons of dugout water. Copper sulphate can be toxic to fish. DO NOT EXCEED THIS RATE! Aeration is necessary, as die off of the plant life robs oxygen from the water and your fish.

Filamentous algae

If the algae is a filamentous species, then use of Reglone A is an option. Another possibility is to use a light inhibiting dye called Aquashade. This product is a blend of blue and yellow dyes that screen out sunlight and inhibit photosynthesis.

For more information on aquatic plant identification and management please refer to:

An Identifiction Guide to Alberta Aquatic Plants. Alberta Environmental Protection. Available through FEESA (An Environmental Education Society) #601, 10179 - 105 Street, Edmonton, AB. T5J 3N1

AAFRD Factsheet *Dugout Maintenance*, Agdex 716(B31)

AAFRD Factsheet *Biological Weed Control in Alberta Using Triploid Grass Carp,* Agdex 485/641-1

How to Identify and Control Water Weeds and Algae, 5th edition, J.C. Schmidt, Applied Biochemists, Inc. Available through Cygnet Enterprises in Flint Michigan by phoning (810) 744-0540

Macrophytic algae - Chara

ALBERTA FISH FARMER ASSOCIATION

According to Steve Mckenzie-Grieve, president of the Alberta Fish Farmers Association (AFFA), "the AFFA was formed in 1987 to join together a fledgeling commercial aquaculture industry". Its mission statement is "To effectively represent the Alberta commercial fish farming industry in the areas of marketing, production, education and quality control." Dealing with research and government issues are also very important to the Alberta Fish Farmers Association.

The association plans to effectively enhance positive communication. This can be accomplished by promotion at trade shows, producing newsletters, representing and negotiating producer interests for the industry and hosting workshops & seminars. Membership costs are $100 annually for a voting member and $15 for a non- voting member.

For more information on the Alberta Fish Farmer Association please contact Steve McKenzie-Grieve at Chin Coulee Trout Farm near Lethbridge. Telephone (403)345-2036

Bonnie Mackenzie-Grieve of Chin Coulee Trout Farm feeding fish with Ellen Frombach head of AAFRD's Sheep & Diversified Livestock.

Aquaculture Section Update

In my column I will try and keep producers aware of some of the things the Aquaculture Section of Alberta Agriculture Food and Rural Development is involved with. We have only been in existence for just over a year but much is happening as the aquaculture industry evolves at a rapid pace.

Code of Practice Review
Alberta Environmental Protection (AEP) is currently reviewing the Code of Practice for Small Fish Farms and Fish Processing Plants. The code was put in place in September 1996 to address environmental issues of waste control and substance release. The review will hopefully identify ways and means of reducing the burden of obtaining regulatory approvals and activities while still maintaining appropriate standards for environmental protection.

CH2M Gore & Storrie Limited are the consultants hired by AEP to do the evaluation. To accomplish their task, the consultants are contacting industry associations, commercial facilities, government departments and other stakeholders.

Alberta Agriculture Food and Rural Development (AAFRD), aquaculture section has been asked to review the consultants report and to provide feedback. AAFRD will be reviewing and discussing items that may affect commercial fish farmers with the Alberta Fish Farmers Association.

New License Available
A new five year Recreational Fish Culture License is now available for sale here in Alberta. The new license enables a recreational license holder the option of only having to renew the license every five years instead of annually. The cost remains the same, $10.00 for the annual license or $50.00 for the five year. The licenses are available through all agriculture district offices throughout Alberta.

Risk Assessments
AAFRD recently received three applications for new species introductions into Alberta. The three applications being considered are: an independent research proposal on the potential to culture Gulf White Shrimp, in a closed water re-circulating aquaculture system; a proposal to examine Silver Carp indoors to research the feasibility of using the species as an agent in the biological control of phytoplankton in ponds and dugouts; and a proposal to import Bigmouth Buffalo fish for the fresh fish table market. All were submitted to the newly formed Aquatic Introductions and Transfer Committee for a Risk Assessment . A Level 1 Assessment has been completed and recommendations forwarded to AEP and AAFRD for a joint decision on whether to approve or reject the applications Duncan Lloyd, manager of AAFRD's Aquaculture Section in Lethbridge, Telephone (403) 381-5539.

Aquaculture on the Internet

Considerable aquaculture information is available at your fingertip on the Internet. Typical costs for being hooked up can vary by location and amount of time you use this service. One can be on-line for a few hours each week for as little as $10.00 per month. You can enjoy seemingly unlimited time (100 hours) for $35.00 a month. Set-up fees usually apply. This time can also be used as an inexpensive way to communicate electronically to other aquaculturists or clients throughout the world (e-mail).

The computer you need should have a minimum 486 processor to receive adequate information in a timely manner. It is suggested that the modem used by your computer be a 28.8 K capacity or better. The faster the modem, the faster the response time.

You can then view, print and download information and pictures with relatively little problem. Following are some Internet addresses you might want to explore and eventually bookmark:

ag.ansc.purdue.edu/aquanic/ AquaNIC is the national aquaculture network information centre at Purdue University.

www.naqua.com/index.html is Northern Aquaculture, the voice of coldwater aquaculture in North America, out of Vancouver Island, mainly Canadian content.

www.aquanet.com/ is a free information provider about living resources & technology related to marine and freshwater environments throughout the aquatic world. Out of Charleston RI.

aqua.ucdavis.edu/ is a regional aquaculture information centre from the U of Davis, Calif.

www.geocities.com/CapeCanaveral/Lab/7490/ is an aquaculture health page, containing information on dis-eases, drugs, nutrition, water quality, etc.

www.ag.auburn.edu/dept/faa/faa1.html is an international centre for aquaculture and aquatic environments. Located at the University of Auburn, Alabama

www.fisheries.org is the American Fisheries Society.

www.ustfa.org/index.html is the US Trout Farmers Association & voice of the national trout industry, from Charlestown, WV

www.uidaho.edu/ag/aquaculture/ is the Aquaculture Information Service, from University of Idaho

www.agricgov.ab.ca/navigation/livestock/aquaculture/index.html is Alberta Agriculture, Food & Rural Development's information on aquaculture, including a fingerling supplier list

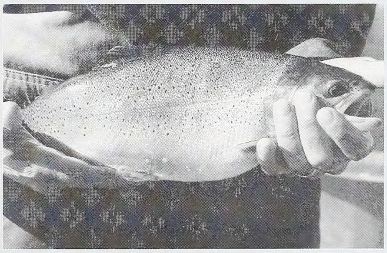
RESEARCH UPDATE

The Aquaculture Section is currently involved with investigating the potential of culturing new fish species, developing alternate fish feeds, and monitoring the impact of aquaculture effluents on the water quality of natural waters.

Silver Carp, a member of the Chinese carps, closely related to grass carp, is being investigated in 1998/99 for the biological control of phytoplankton (predominately blue-green algae) in farm ponds. They are herbivorous fish with capabilities to filter microscopic algae (phytoplankton) from the water column. The study will determine the silver carp's effectiveness to reduce toxic blue green algae blooms in farm dugouts and fish ponds. The potential of overwintering this warm water species in the colder climatic conditions of Western Canada will also be determined.

A genetic strain (Eagle Lake) of rainbow trout from California is being cooperatively studied with Alberta Fish and Wildlife Division, Alberta Conservation Association and the Alberta Fish Farmers Association. Present strains of rainbow trout stocked in prairie ponds are often short lived because of stress from high alkalinity of the water. Because of the Eagle Lake rainbow's tolerance to high pH and alkaline waters, this unique species is extensively stocked in Western USA.

Researchers at the Alberta Research Council (Vegreville) are studying culture potential of the cold water Arctic Char species in controlled re-circulating aquaculture systems.



AAFRD's Animal Industry Division, with support from Chin Coulee Trout Farms, conducted a "Value Added" research project. This twelve week study investigated the use of insects reared from seed cleaning plant screenings as an alternate source of fish food. Twenty experimental populations of fingerling rainbow trout were fed 5 differing rations. Preliminary data indicates that trout growth and body condition were superior when fish diets included equal proportions of house fly larvae and trout grower rations. The final report is scheduled for publication in September, 1998

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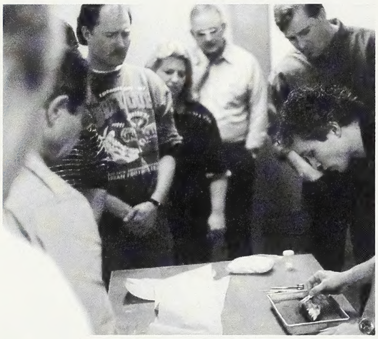
COURSES, PUBLICATIONS & EVENTS

Courses

Two aquaculture courses will be offered by AAFRD in conjunction with the Lethbridge Community College during the fall/ winter of 1998. One is "Brood Stock Management," designed for current and potential commercial fish producers. The course will cover egg stripping, incubation, larval husbandry, manipulation of fish to produce sterility, and brood fish conditioning and spawning. It is planned in the fall of 1998 in Lethbridge, to coincide with spawning activities at a local hatchery.



Recent aquaculture course "Basic Principles of Aquaculture" at Penhold

The other course is "Fish Pathology." It will cover basic pathology, diagnostic procedures and treatment techniques of cold and warm water fish. Diseases frequently encountered in aqua-culture operations will be discussed. This course will require two full days for completion, likely in December. The exact dates are to be determined by the next issue of "Aquaculture in Alberta."

To pre-register for the Broodstock Management Course or to obtain more information on aquaculture courses, contact: Eric Hutchings, aquaculture section biologist, AAFRD Lethbridge at (403) 381-5573.

Publications

A number of aquaculture publications are available on short-term loan through your local AAFRD office. Most are maintained with the Aquaculture Section in Lethbridge. Some of the text publications available for loan include:

- *Cage Culture*, Beveridge, M., 1996.
- *Culture of Salmonid Fishes*, Stickney, R.S. 1991.
- *Fish Hatchery Management*, Piper et al. 1982.
- *Principles of Warmwater Aquaculture*, Stickney, R.S. 1979. *Salmon Aquaculture*, Heen et al.1993.
- *Textbook of Fish Health*, Post, G. 1987.
- *Water Quality Management for Pond Culture*, Boyd, C.E. 1992

Fact sheets from the AAFRD office near you include:

- *Biological Weed Control in Alberta using Triploid Grass Carp*. Agdex 485/641-1
- *Freshwater Aquaculture Industry* / Ag -Ventures series Agdex 485/830-1 (under review).

Events

August 30-Sept 3
Third International Symposium on Aquatic Animal Health. Renaissance Harborplace Hotel, Baltimore, Maryland. Symposium office: Division of Comparative Medicine, John Hopkins University School of Medicine, 720 Rutland Ave., Baltimore, MD 21205. Tel (410) 955-3273. Fax: (410) 550-5068.
E-mail:wellfish@welchlink.welch.jhu.ed

October 8 to 10, 1998
United States Trout Farmers Association - fall meeting, at Canyon Springs Park Hotel, Twin Falls, Idaho Tel (304) 728-2189, Fax (304) 728-2196.
E-mail: ustfa@intrepid.net

November 10-13 1998.
18th International Symposium of the North American Lake Management Society. Banff Springs Hotel, Banff, Alberta, Canada. Contact Alberta Lake Management Society, Dept of Biological Sciences, University of Alberta, Edmonton, AB, T6G 2E9.
E-mail: rzurawel@gpw.srv.ualberta.ca.

Editor's Notes

This bulletin on Alberta's Aquaculture Industry is intended as resource material and as a current update for people interested in aquaculture. If you would like to submit articles or provide us with input, feel free to contact Eric Hutchings, the editor, in Lethbridge at (403) 381-5574 or **E-mail** ***hutchin@agric.gov.ab.ca.***

Copies can be obtained on the Internet from the Department of Agriculture's **Ropin the Web** Home Page located at ***http://www.agric.gov.ab.ca//index.html***

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